FSNSF-D

SIGNAL GENERATOR (50 MHz to 8 GHz)

1. GENERAL. This procurement requires a stable microwave signal generator capable of generating signals over the frequency range of 50 MHz to 8 GHz with internal and external modulation capabilities.

2. CLASSIFICATION. The equipment shall meet the requirements of MIL-T-28800, Type III, Class 5, Style E, Color R for Navy shipboard, submarine, and shore applications with the following modifications and exceptions:

a. The relative humidity requirement is limited to 95% noncondensating.

b. The operating and nonoperating altitude requirements are not invoked.

c. The electromagnetic interference requirements of MIL-T-28800 are limited to CE01, CE03, CS01, CS02 (0.05 to 100 MHz), CS06, RE01 (back panel search excluded), RE02 (14 kHz to 1 GHz), and RS03.

d. The warm-up time is extended to one hour.

3. OPERATIONAL REQUIREMENTS. The equipment shall be capable of generating signals within the parameters and accuracies specified herein.

3.1 Frequency characteristics.

3.1.1 Frequency range. At least 50 MHz to 8 GHz.

3.1.2 Frequency resolution. Minimum resolution at least 1 kHz; digital readout.

3.1.3 Frequency accuracy. Equal to accuracy of reference standard (CW mode).

3.1.4 Frequency stability (equal to or better than limits specified below).

3.1.4.1 Internal. Less than 1 part in 109/hr at 25_C _5_C after one hour warmup.

3.1.4.2 External. Equal to external standard frequency stability.

3.1.4.3 Temperature. Less than _2 parts in 105 change over 0 to 50_C temperature range.

3.1.5 Residual modulation (CW mode in 50 Hz to 15 kHz detection BW).

3.1.5.1 FM. Less than 150 Hz rms.

3.1.5.2 AM. Less than 0.15% pk.

3.1.6 Spectral purity (F = carrier frequency).

3.1.6.1 Harmonics. < -30 dBc.

3.1.6.2 Power line/fan rotation related harmonics. < -30 dBc (< 1 kHz from carrier).

3.1.6.3 Nonharmonics/Spurious. < -55 dBc (_ 10 kHz from carrier).

3.1.6.4 Phase noise. < -80 dBc/Hz at 10 kHz offset from carrier.

3.1.6.5 RF leakage. < -70 dBm into 50_ using 2-turn, 1 inch diameter loop 1 inch from any surface, with output connector terminated in 50_.

3.2 Output characteristics.

3.2.1 Range. +10 to -120 dBm leveled (minimum).

3.2.2 Accuracy. _2.0 dB for output levels from +10 dBm to -50 dBm; additional 0.1 dB/10 dB step for levels below -50 dBm.

3.2.3 Display/Resolution. Digital display; minimum resolution of 0.1 dB.

3.2.4 Flatness. _1.0 dB measured at an output level of +10 dBm.

3.2.5 Impedance/Connector. 50_; type-N female connector.

3.2.5.1 VSWR. < 2:1 (Level _ 0 dBm).

3.2.6 Reverse power protection. The generator shall be capable of accepting the following signal levels at its output connector without resulting damage.

3.2.6.1 Average power. 5W.

3.2.6.2 Peak power. 2 kW (2.3 GHz < F < 8.0 GHz).

3.3 Modulation characteristics.

3.3.1 Pulse modulation.

3.3.1.1 Internal.

3.3.1.1.1 Rate (PRF). 50 Hz to 50 kHz.

3.3.1.1.2 Width (PW). 0.1 to 10.0 _sec.

3.3.1.1.3 Rise/Fall times. < 50 nsec.

3.3.1.1.4 ON/OFF ratio. _ 80 dB.

3.3.1.1.5 Delay. 50 nsec to 100 msec.

3.3.1.1.5.1 Accuracy. _ 20% of setting.

3.3.1.1.5.2 Sync pulse output. TTL compatible; rise time less than 50 nsec.

3.3.1.1.5.3 Video pulse output. TTL compatible; width corresponds to PW control setting.

3.3.1.1.6 External trigger input. TTL compatible; at least 100 Hz to 50 kHz; provides sync rate for pulse modulation.

3.3.1.2 External.

3.3.1.2.1 Rate (PRF). 50 Hz to 50 kHz.

3.3.1.2.2 Width (PW). > 0.1 _sec.

3.3.1.2.3 Video output. TTL compatible pulse; same PW and PRF as external input pulse

3.3.1.2.4 Pulse input. TTL compatible.

3.3.2 Amplitude modulation (AM) (Level _ 0 dBm) (F = carrier freq; _F = peak freq deviation).

3.3.2.1 Internal AM.

3.3.2.1.1 Rate. 10 Hz to 100 kHz.

3.3.2.1.2 Depth. 0 to 90%.

3.3.2.1.3 Accuracy. _10% of setting (50% depth @ 1 kHz).

3.3.2.1.4 Distortion. _ 5% (50% depth @ 1 kHz).

3.3.2.1.5 Incidental FM. _ 200 Hz rms (0.05 - 15 kHz BW) (50% depth @ 1 kHz).

3.3.2.1.6 Residual AM (AM mode). _ 0.2% pk (0.05 - 15 kHz BW) (0.0% depth @ 1 kHz).

3.3.2.2 External AM.

3.3.2.2.1 Rates. 10 Hz to 20 kHz.

3.3.2.2.2 Depth. 0 to 90%.

3.3.2.2.3 Distortion. _ 5% (50% depth @1kHz).

3.3.3 Frequency modulation (FM) (F = carrier freq; _F = peak freq deviation).

3.3.3.1 Internal FM.

3.3.3.1.1 Rate. 10 Hz and 100 kHz.

3.3.3.1.2 FM Deviation. _ 400 Hz to at least 100 kHz peak (F _ 100 MHz) _ 400 Hz to at least 1 MHz peak (100 MHz _ F _ 500 MHz) _ 400 Hz to at least 2 MHz peak (F _ 500 MHz).

3.3.3.1.3 FM Accuracy. _10% (_F _ 50 kHz); _20% (5 _ _F < 50 kHz).

3.3.3.1.4 Distortion. _5% (_F=300 kHz @ 10 kHz).

3.3.3.1.5 Incidental AM. _ 0.2% (50 Hz - 15 kHz BW) (_F = 20 kHz @ 1 kHz).

3.3.3.1.6 Residual FM (FM mode). _ 500 Hz rms (0.05 - 15 kHz BW) (_F = 0.0 kHz @ 1 kHz).

3.3.3.2 External FM.

3.3.3.2.1 Rates. At least 10 Hz to 100 kHz.

3.3.3.2.2 FM deviation. _ 400 Hz to at least 100 kHz peak (F _ 100 MHz) _ 400 Hz to at least 1 MHz peak (100 MHz _ F _ 500 MHz) _ 400 Hz to at least 2 MHz peak (F _ 500 MHz).

3.3.3.2.3 FM accuracy. _10% (_F _ 50 kHz); _20% (5 _ _F < 50 kHz).

3.3.3.2.4 Distortion. _5% (_F=300 kHz @ 10 kHz).

4. GENERAL REQUIREMENTS.

4.1 Power source. 115 and 230 Vac _10%, single phase, at line frequencies of 50, 60, and 400 Hz within _10%, less than 250W.

4.2 Dimensions. The total volume shall not exceed 46,000 cm3 (2,800 in3).

4.3 Weight. The overall weight shall not exceed 27.3 kg (75 lbs).

4.4 Calibration interval. The calibration interval shall be 12 months minimum. The equipment shall be within all accuracy requirements specified herein, with a 72% or greater confidence factor following a calibration interval of 12 months.

4.5 Remote operation. The unit will be capable of remote operation via IEEE-488 bus interface. It shall operate as a talker or listener such that all functions except the power on/off switch are controllable, and shall have as a minimum the following subset of GPIB commands: AH1, SH1, T6, L4, SR1, RL1, DC1, DT1.